

REMARKS

In the Office Action, claims 1-39 were rejected, and the specification and drawings were objected to. By the present Response, the specification is corrected and corrections are proposed to the drawings. Claim 29 has been amended to correct an improper dependency. Claims 1-39 are believed to be patentable for the reasons set forth below. Reconsideration and allowance of all pending claims are requested.

Objections to the Specification

The Examiner objected to certain inadvertent errors in the Detailed Description that have been corrected by the Response. Reconsideration is requested.

Objections to the Drawings

The Examiner indicated that the drawings should be amended or completed to enhance their clarity. By this Response corrections are proposed in the attached hand annotated sheets. Consideration and approval of the changes are requested. Formal drawings including the corrections will be filed following an indication that the corrections appropriately address the Examiner's concerns.

Moreover, the Examiner requested that the specification and drawings be carefully reviewed for use of the terms Ms, If and In. Following such review, certain changes have been made to the drawings. However, Applicant would point out that the mask Ms, the filtered image If and the normalized image In indicated in the figures now appear to be correctly used. In particular, in Fig. 3 the images indicated do result from the indicated steps, but are not necessarily the immediate inputs to subsequent steps summarized in the flow chart. Similarly, where the notation "In (structure)" or "In (non-structure)" is used in the drawings, this does correctly refer to the normalized image, although operations are performed on the structure alone or the non-structure alone.

Accordingly, all necessary corrections to the drawings and specification are believed to have been addressed, and their reconsideration is requested.

Rejections Under 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 1-39 under 35 U.S.C. § 103(a) as obvious in view of various references. Applicant, as discussed further below, respectfully asserts that the instant claims are not obvious in view of the cited references, taken alone or in combination.

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985).

First Rejection Under Section 103

In the Office Action, claims 1, 2, 4-8, 22-24, 26-29, 30-33 and 35-39 were rejected under 35 U.S.C. § 103 as being unpatentable over Li et al. (US Patent No. 5,602,934) in view of Noll et al (Homodyne Detection in Magnetic Resonance Imaging; IEEE Paper ISBN: 0278-0062). Claims 1, 22, and 30 are independent. Applicant respectfully traverses this rejection.

The Examiner enumerated a number of passages from Li et al. said to read on or make obvious the subject matter of the pending claims. For example, the

Examiner argued that Li et al. teach *identifying structural features from the smoothed image data, orientation smoothing the structural features, and homogenization smoothing non-structural regions*. Applicant notes, however, that the recitations indicated by the Examiner do not, in fact, correspond with the pending claims, and that the passages relied upon by the Examiner do not support a *prima facie* case of obviousness.

Independent Claim 1 and the Claims Depending Therefrom

Independent claim 1 recites a method for enhancing a discrete pixel image, the method comprising consecutive steps of smoothing image data, identifying structural features from the smoothed image data, orientation smoothing the identified structural features, homogenization smoothing non-structural regions, orientation sharpening the structural features, and blending texture from the image data into data processed.

The Examiner asserted that Li et al. disclose *identifying structural features* from the previously smoothed image. Office Action, page 4 (citing Li et al., Figures and 2, col. 7, ll. 4-67, col. 8, ll. 1-57). The Applicant respectfully points out that the passages of Li et al. cited by the Examiner are directed to examining the relationship between image differences, calculated from the difference between smoothed subimages of the original image and the original image itself, and image tissue structures. Li et al., col. 7, ll. 4-5. The cited passage describes that smaller image differences result when the original image is filtered along edges or lines, creating a subimage which provides a good smoothed approximation of the original image. *Id.* at col. 7, ll. 6-13. On the other hand, larger differences result when smoothing is done across edges or lines creating a smoothed subimage which is severely distorted as compared to the original image. *Id.* at col. 7, ll. 13-8. These image differences are thus taken into account in calculating weighting parameters that are used for recombining the subimages and forming the final image. *Id.* at col. 7, ll. 44-6.

Accordingly, Li et al. is not directed to identifying structural features of the smoothed images, but it is aimed at determining which one of the subimages should have a larger weighting parameter when the subimages are recombined to form the final image.

Even if the process of determining weighting parameters for each subimage was to be characterized as identifying structural features, Li et al. do not teach the additional recited steps of *orientation smoothing the structural features* and *homogenization smoothing of non-structural regions of the image*, as recited in claim 1. The image differences in Li et al. are used to calculate weighting parameters that determine how the subimages are recombined to form the final image. Li et al. does not teach orientation smoothing of the structural features after they have been identified. In fact, the passages cited by the Examiner for asserting that Li et al. teach orientation smoothing the structural features precedes the passages cited to by the Examiner for identifying the structural features. It is clear that Li et al. can not teach orientation smoothing of the structural features before they have been identified. Accordingly, the cited reference does not teach orientation smoothing the structural features and homogenization smoothing of non-structural regions, as recited by the claim.

Indeed, the process of Li et al. is simply not comparable to the structure identification and further processing recited in claim 1. As claimed, once structure is identified, separate regions of structure and non-structure are smoothed. In the process of Li et al. no such smoothing is performed, or even of use, given the selection of weighting values for the contributions of the separate subimages.

Given the shortcomings of Li et al. with regards to the recitations of claim 1, Applicant submits that a *prima facie* case of obviousness has not been made by the Examiner. The secondary reference cited fails to obviate these deficiencies, nor does

the Examiner suggest that it does. Moreover, Applicant believes that all of the pending dependent claims are equally allowable both by virtue of their dependency from an allowable base claim, and for the subject matter they separately recite. With the foregoing in mind, Applicant respectfully requests reconsideration and allowance of the instant claims.

Independent Claim 22 and the Claims Depending Therefrom

Independent claim 22 recites, *inter alia, orientation smoothing the structural features based upon a dominant orientation for each pixel and an orientation orthogonal to the dominant orientation*. Applicant respectfully asserts that the cited references, taken alone or in combination, fail to disclose these features.

As discussed above, Li et al. fail to disclose orientation smoothing the structural features of the image after the features have been identified. As such, it is clear that Li et al. does not teach the more limited step of *orientation smoothing the structural features based upon a dominant orientation for each pixel and an orientation orthogonal to the dominant orientation*. Li et al. merely disclose determining the image differences between previously smoothed subimages and the original image, and calculating weighting parameters used to recombine the subimages forming the final image. As noted above, the secondary reference does nothing to obviate the deficiencies of Li et al. in this regard.

Given the shortcomings of Li et al. and the secondary reference with regards to the recitations of claim 22, Applicant submits that a *prima facie* case of obviousness has not been made by the Examiner. Moreover, Applicant believes that all of the pending dependent claims are equally allowable both by virtue of their dependency from an allowable base claim, and for the subject matter they separately recite. With the foregoing in mind, Applicant respectfully requests reconsideration and allowance of the instant claims.

Independent Claim 30 and the Claims Depending Therefrom

Independent claim 30 recites, *inter alia*, *identifying structural features from the smoothed image data, orientation smoothing the structural features, homogenization smoothing non-structural regions*. Applicant respectfully asserts that the cited references, taken alone or in combination, fail to disclose these features.

As discussed above, Li et al. fail to disclose identifying structural features from the smoothed image data, orientation smoothing the structural features, and homogenization smoothing non-structural regions. Li et al. merely disclose determining the image differences between previously smoothed subimages and the original image, and calculating weighting parameters used to recombine the subimages forming the final image. Given the shortcomings of Li et al. with regards to the recitations of the claim, Applicant submits that a *prima facie* case of obviousness has not been made by the Examiner. Moreover, Applicant believes that all of the pending dependent claims are equally allowable both by virtue of their dependency from an allowable base claim, and for the subject matter they separately recite. With the foregoing in mind, Applicant respectfully requests reconsideration and allowance of the instant claims.

Second Rejection Under Section 103

In the Office Action, claims 3, 9-21, 25, and 34 were rejected under 35 U.S.C. § 103 as being unpatentable over Li et al. (US Patent No. 5,602,934) further in view of Noll et al (Homodyne Detection in Magnetic Resonance Imaging; IEEE Paper ISBN: 0278-0062) and Felmlee et al. (US Patent No. 5,900,732). Claims 9 and 16 are independent. Applicant respectfully traverses this rejection.

Independent Claim 9 and the Claims Depending Therefrom

Independent claim 9 recites, *inter alia, orientation smoothing the structural features and homogenization smoothing non-structural regions*. The Examiner asserts that the limitations of *orientation smoothing* and *homogenization smoothing* are disclosed in Li et al. However, as discussed above, Li et al. fail to disclose orientation smoothing the structural features and homogenization smoothing non-structural regions. Moreover, neither the Examiner nor the Felmlee et al. reference itself suggests that the Felmlee et al. reference is capable of obviating the deficiencies of Li et al. as discussed above.

Furthermore, the Examiner asserts that the recitation of *identifying structural features from discrete pixel image data based upon a user selected scaling factor applied to a predetermined threshold value* is disclosed by the Felmlee et al. reference. Applicant respectfully points out that the Felmlee et al. reference is directed to automatically setting a window level value and a window width value for an MRI image, and mapping a reconstructed MRI image through a window defined by those values. Felmlee et al., Abstract, col. 4, ll. 3-5. However, Felmlee et al. merely teach that for setting the window level and window width values a threshold value can be manually input, while a scale factor is set to a predetermined value. *Id.* at col. 4, ll. 5-9. Felmlee et al. do not teach *identifying structural features from discrete pixel image data based on a user input scaling factor applied to a predetermined threshold value*.

Accordingly, Applicant respectfully asserts that the cited references, taken alone or in combination, fail to disclose all of the features recited in the instant claim and, as such, assert that the independent claim 9 and its respective dependent claims are not obvious in view of the cited references. With the foregoing in mind, Applicant respectfully requests reconsideration and allowance of the instant claims.

Independent Claim 16 and the Claims Depending Therefrom

Independent claim 16 recites, *inter alia, orientation smoothing the structural features and homogenization smoothing non-structural regions*. The Examiner asserts that the recitation of orientation smoothing and homogenization smoothing are disclosed in Li et al. However, as discussed above, Li et al. fail to disclose orientation smoothing the structural features and homogenization smoothing non-structural regions. Moreover, neither the Examiner nor the Felmlee et al. reference itself suggests that the Felmlee et al. reference is capable of obviating the deficiencies of Li et al. as discussed above.

Accordingly, Applicant respectfully asserts that the cited references, taken alone or in combination, fail to disclose all of the features recited in the instant claim and, as such, assert that the independent claim 16 and its respective dependent claims are not obvious in view of the cited references. With the foregoing in mind, Applicant respectfully requests reconsideration and allowance of the instant claims.

Conclusion

In view of the remarks and amendments set forth above, Applicant respectfully requests allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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